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GENERAL NOTES.

BOTANY.

THE MUTUAL RELATIONS BETWEEN FLOWERS AND THE INSECTS WHICH SERVE TO CROSS THEM.[1]—In 112 well illustrated octavo pages Dr. Müller has given us a very pleasantly-written account of the present state of our knowledge in this department of biology. Many of the facts and theories are by no means new, but many others appear in print here for the first time.

The writer shows that botany and zoölogy are more than mere "descriptive natural sciences" as they are even yet called, and that not the least of the good resulting from the theory of natural selection, advanced by Darwin, is the revival of an interest in biological studies—an interest which, excited a century ago by Réaumur, Roesel and Sprengel, had been entirely lost in the passion for systematic work which Linnæus inspired in his followers. Beginning with a description of the parts of a flower and their ordinary functions, he shows us how reproduction, the chief object of the flower, is accomplished, how the infinite variety of floral forms is produced from changes in the five fundamental organs of the flower—the calyx, corolla, stamens, ovary and nectar glands; how cross-fertilization tends to strengthen a series of descendants, and self-fertilization to weaken them; and how natural selection must preserve the former and render permanent such qualities as tend to secure crossing, while the latter will, in time, give place to them.[2] The probable course of development, from the lowest forms of life of those plants which are merely cellular, as the Algæ, mosses and liverworts, and still further of the vascular cryptogams and phænogams is well traced.

As regards their means of fertilization, plants are divided into two groups:

a. Gymnogamæ, including all plants which possess naked male cells capable of independent motion through the water to the female cell. This group contains all the sexual cryptogams, and is but slightly discussed by Dr. Müller.

b. Angiogamæ, including plants whose male cells are enclosed in a protecting cell wall, and are carried to the female cell by foreign agency. With this group, containing all the Phænogams, the present paper is chiefly concerned.

As agents for transferring the male cells or pollen of the Angiogamæ, we find water, wind, and various animals, as is well expressed in the terms *Hydrophilæ* (water-loving), *Anemophilæ* (wind-loving), and *Zoidiophilæ* (animal-loving), often applied to the different groups of Phænogams, according to the agency by which they are fertilized. Of the Hydrophilæ our common *Vallisneria spiralis* may serve as an example. The Anemophilæ may be subdivided into *Archispermæ* and *Metaspermæ*, represented respectively by the pine and the oak, the former possessing naked ovules and winged pollen-grains, the latter, ovules enclosed in a pistil and wingless pollen; and, as indicated by the names, there is much reason to believe that the former represent an earlier stage in the development of plants than the latter. The Zoidiophilæ are divided into three groups, *Malacophilæ*, fertilized by snails, *Entomophilæ*, fertilized by insects, and *Ornithophilæ*, fertilized by birds. The first and last are represented by comparatively few species, by far the greatest number being entomophilous.

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[1] *Die Wechselbeziehungen zwischen den Blumen und den ihre Kreuzung vermittelnden Insekten.* H. MULLER in Schenk's Handbuch der Botanik.

[2] It may be well to refer such readers as are interested in the discussion of this subject to an article by Rev. Geo. Henslow, in the *Popular Science Review* for January, 1879, where the figures by which Mr. Darwin proves the value of cross-fertilization, in his book on that subject, are made to show that after the first few generations there is a constant tendency towards equality between crossed and self-fertilized offspring, and where many instances of constant self-fertilization are collected.

The writer gives a brief but clear account of cleistogamy and heterogymy, which Mr. Darwin has so well treated in his work on Different Forms of Flowers in Plants of the same Species, and gives many illustrations of the adaptation of certain flowers to the visits of certain groups of insects, as outlined in the NATURALIST for April, and of the various contrivances by which insects are enabled to obtain food from flowers of different forms. One of the most interesting of these is that of a Brazilian species of *Nemognatha* (a beetle), the maxillæ of which are developed to a length of twelve mm., exceeding the length of the insect's body and resembling the similarly-formed proboscis of butterflies. Very interesting, too, is the tongue of one of the higher bees, for when a bee is sucking nectar from a flower the fluid must necessarily rise the entire length of the tongue before reaching the organs of taste, and were it sucked up and then found unsatisfactory that which remains adhering to the whorls of hairs with which the tongue is provided would contaminate the nectar of the next flower visited, or at least destroy its proper taste. To avoid this difficulty the tongue of the higher bees is provided with a capillary tube in place of the chitinous rod found in that of the lower bees, and this communicates at its base with the taste organs, and opens into a spoon-shaped enlargement at the distal end of the tongue. On visiting a flower the bee thrusts this spoon-shaped organ into the nectar, and a portion immediately rises through the tube by capillary attraction, but if not of pleasing taste it is readily expelled before any has become entangled in the hairs surrounding the tongue.

The paper is, throughout, one of exceeding interest, and it is to be wished that every student of biology, and especially every young student, might read it.—*Wm. Trelease.*

BOTANICAL NEWS.—In the *Bulletin* of the Torrey Botanical Club for April, C. F. Austin, in notes on Hepaticology, describes new liverworts from Florida, South Carolina and California, and several new exotic species. Prof. Eaton continues his notes on new or little known ferns of the United States.——Trimen's *Journal of Botany*, for May, contains A. W. Bennett's Polygalæ Americanæ novæ vel parum cognitæ.——Among other articles in Caruel's *New Italian Botanical Journal*, is one by F. Sestini on the action of the vapor of different substances in the seed during germination.——Three eminent botanists have recently died, Prof. G. L. Reichenbach, of Dresden, aged 86; Dr. F. M. Ascherson, at Berlin, aged 81; also Prof. Griesebach, who died at Göttingen, May 13th.

ZOÖLOGY.[1]

STRANGE HABITAT OF A BARNACLE ON A GAR PIKE.—I have recently received a barnacle from Mr. Jos. Wilcox, of Philadelphia, which he obtained from the scales of a gar in Hernando county, Florida. The specimens are small; the largest measures eight millimeters in carino-rostral diameter, about seven mm. in the other, the smaller specimen seven mm. in the first, and six mm. in the other direction. As nearly as I can make out, it is very near if not identical with *Platylepas decorata* Darw., though this species seems hitherto to have been recorded as coming from the Pacific only; the Florida locality is of considerable interest, therefore, as extending the range of the species. The fish from which the specimens were obtained was found in brackish water, and therefore agreeing in the nature of its habitat with the probable conditions of the water in the Gambia river, Africa, where the *P. bissexlobata* has been found on the manatee. There are no pores in the parietes, the midribs of the compartments were well developed, and in one specimen the membranous basis was as convex as the shell, in the other not quite as convex. The basal membrane seems to be reflected up over the parietes to near the aperture and also to extend some way outwards from the attached margin of the compartments, as if to afford a more extensive attachment to the fish.

I have been unable to find any record of the occurrence of these and kindred forms on the gar, but it would be well adapted to them, as their scales would afford secure attachment.

It would be of interest to know whether the creature's shell left a depression in the scales of the fish equal to the convexity of the basal membrane. Mr. Darwin observes in regard to other barnacles which attach themselves to turtles, whales and sharks, in effect, that the growth of the shell of the parasite into the tissues of its host is due to a force similar to that which impels the root of a tree through hard compacted soil.—*John A. Ryder.*

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[1] The departments of Ornithology and Mammalogy are conducted by Dr. ELLIOTT COUES, U. S. A.